

Adherence to treatment among hypertensives of rural Kerala, India

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ABSTRACT

Introduction: Poor adherence is an important barrier to adequate blood pressure control among the diagnosed hypertensives. The study aimed at assessing the level of adherence to medication and to identify factors associated with it in people with hypertension in a rural population of Kerala. **Subjects and Methods:** A community-based cross-sectional study was conducted in July 2016 among 189 known hypertensives of a rural population in Kerala. Data was collected by interview method using a semistructured questionnaire. Medication adherence was assessed using 4-item Morisky Medication Adherence Scale. Chi-square was used to test the significance of association, and logistic regression was done to identify independent predictors along with odds ratio (OR). **Result:** The mean age of study participants was 65.12 ± 11.71 years and the mean duration of disease was 8.69 ± 7.99 years. High adherence was seen in 46% of the patients, while medium and low adherence was seen in 41.3% and 12.7%, respectively. Risk factors of poor adherence identified were poor knowledge of the complications (OR – 2.120; 95% confidence interval [CI] 1.110–4.048), availing government pharmacy (OR – 2.379; 95% CI 1.131–5.004), and being asymptomatic at the time of diagnosis (OR – 2.120; 95% CI 1.110–4.048). **Conclusion:** Adherence to medication among people with hypertension in the current study is poor. A comprehensive strategy to improve adherence to antihypertensive medications is the need of the hour.

Keywords: Adherence, hypertension, India

Introduction

With sociodemographic and economic transition, India is also going through an epidemiological transition facing a double burden of both communicable and noncommunicable diseases (NCDs). Already recognized as the “Diabetic capital of the world,” India is now heading toward being designated as the “Hypertension capital of the world” too.^[1] Hypertension, also known as raised blood pressure, is the major risk factor of NCD, affecting about three in ten people (29.8%; rural – 25.1%, urban – 41.9%) and accounting for 10% of deaths in India.^[2,3] It is estimated that the number of hypertensives in India will double from 118 million in 2000 to 213.5 million by 2025, and if

urgent actions are not taken, India will stand to lose \$2.17 trillion before 2030 due to cardiovascular diseases.^[4,5] Currently, only about one-fourth (24.9%) of the known hypertensives in rural India are availing treatment, while in urban India, just above one-third (37.6%) are receiving treatment.^[3] Studies have shown that only 10.7% and 20.2% of hypertensives in rural and urban India, respectively, have their blood pressure under control. Although antihypertensive medications are highly effective, their ability to adequately control blood pressure in real-life conditions depend on more than just the pharmacokinetics and pharmacodynamics of the drug. Barriers to adequate blood pressure control include low detection rates, patient attitude, unscientific prescriptions, access to healthcare facilities, and adherence.^[6]

The World Health Organization defines adherence as, “the extent to which a person’s behavior of taking medication, following

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a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider.”^[7] It goes beyond pharmacological therapy and even includes health-related behaviours. When an individual fails to follow the prescribed recommendations of his or her physician in terms of medication and behavioural change, he or she is said to be nonadherent. Nonadherence can not only lead to adverse health outcomes but also increased healthcare costs.^[8] Rates of nonadherence are greater in low- and middle-income countries, compared to the developed countries.^[8] In India, studies have reported rates of nonadherence to medication among the hypertensives to be between 27% and 70%.^[9,10]

Ensuring adherence is as important as diagnosis itself as the benefits of the treatment are not fully realized unless the blood pressure is adequately controlled. An understanding of the factors associated with poor adherence can help the policymakers in formulating and directing interventions at specific groups. Hence, a study was conducted to evaluate the level of adherence to medication as well as to identify possible associated factors in patients with hypertension in a rural population of Kerala.

Subjects and Methods

A community-based cross-sectional study was conducted in July 2016 among the rural population of Njarackal Panchayat, a coastal village in Ernakulam district of Southern India with a predominant fishing community. It is also the rural field practice area of Amrita Institute of Medical Sciences, Kochi. As per the 2011 census, the population of Njarackal Panchayat is 23,760 with a literacy rate of 97.46%. The area is served by one primary health center and multiple private clinics. The study included adults who were (1) aged above 30 years, (2) diagnosed with hypertension for a duration of at least 6 months, and (3) resided in the study area for at least 6 months. Bedridden patients and pregnant women were excluded from the study. Sample size was estimated using the formula Z^2pq/d^2 , where prevalence of non-adherence was taken as 70% based on a study by Chadha *et al* in Delhi.^[10] Setting precision at 10% and assuming 10% non-response rate, the final sample size was estimated to be 182.^[10] The study area has 16 wards, of which three wards were selected randomly. The sample size was split equally with one-third of sample from each ward. In each ward, a junction was visited and the investigators spread out in four directions visiting consecutive houses till the sample size was achieved. In a household with >1 eligible study participant, only one was selected by lottery method.

After obtaining an informed verbal consent, data was collected by interview method using a semistructured questionnaire that had three domains, namely, (1) sociodemographic factors, (2) current morbidity profile, and (3) medication adherence using 4-item Morisky Medication Adherence Scale (MMAS). The Morisky 4-item medication adherence questionnaire consists of a set of four questions with a yes or no answer. One point was awarded for every yes response and zero for every no. A total score of zero

was considered as high adherence, a score of 1 or 2 as medium adherence, and a score of 3 or 4 as low adherence.

Data were tabulated in MS Excel and analyzed using IBM Statistical Package for Social Science (SPSS) version 15. Descriptive statistics such as frequency, percentage, median, and mean with standard deviation was used to summarize the data. Chi-square statistic was used to assess the statistical significance of association between variables. Using backward conditional method, logistic regression was done using variables with $P < 0.2$ in univariate analysis to identify the independent predictors of poor adherence. A significance level of $P < 0.05$ was used in the analysis.

Results

The study included 189 respondents. A total of 372 households were visited to obtain the requisite sample size. The mean age of the respondents was 65.12 ± 11.71 years, and the gender distribution was almost equal (male – 49.2%; female – 50.8%). The prevalence of ever smoker and alcohol use among the males of the study population was 50.5% and 73.1%, respectively. The mean duration of hypertension among the respondents was 8.69 ± 7.99 years. In the study, 96.8% were availing modern medicine. The median number of tablets consumed per day was two and 28% were receiving >4 medications. About half (48.7%) of the respondents reported that it took <15 min to reach the healthcare facility they consult, and 65.1% reported that it took <15 min to reach the pharmacy they purchase the medications from. About three-fourth (74.6%) of the patients availed private pharmacies, while 14.3% availed the pharmacy at the public health facilities and 11.1% bought their medicines from government subsidised pharmacies. The mean monthly expenditure among those having an out-of-pocket expenditure (OoPE) on medicines was Rs. 772.62 ± 935.6 which is $4.77 \pm 4.23\%$ of the monthly family income. The sociodemographic and clinical profile of the respondents is given in [Tables 1 and 2], respectively.

As per 4-item MMAS, 46% of the patients were highly adherent, while 41.3% and 12.7% had medium and low adherence, respectively. The median adherence score was 1 (interquartile range 0–2). Majority of the patients had received advice regarding adherence to medications (80.4%), and most of the patients received the advice from their doctors (99.3%). Univariate analysis of factors associated with poor adherence to medication is given in [Table 3]. The significant independent risk factors of poor adherence [Table 4] identified after logistic regression include poor knowledge of the complications (adjusted odds ratio [aOR] 2.120; 95% CI 1.110–4.048), availing government pharmacy (aOR 2.379; 95% CI 1.131–5.004), and being asymptomatic at the time of diagnosis (aOR 3.347; 95% CI 1.695–6.607).

Discussion

Adherence is a major barrier not only in the treatment of hypertension but also for all chronic diseases that require

Table 1: Sociodemographic characteristics

Variable	Frequency (f) (%)
Age	
30-45	15 (7.9)
46-60	51 (27.0)
61-75	88 (46.6)
>75	35 (18.5)
Gender	
Male	93 (49.2)
Female	96 (50.8)
Marital status	
Never married	6 (3.2)
Currently married	142 (75.1)
Widow/widower	41 (21.7)
Education	
<High school	53 (28.0)
≥High school	136 (72.0)
Occupation	
Unemployed	104 (55.0)
≤Skilled	46 (24.4)
>Skilled	39 (20.6)
Socioeconomic class, BG Prasad scale (n=118)	
≤Middle	57 (48.3)
>Middle	61 (51.7)

long-term medication. Nonadherence to antihypertensive medication will ultimately result in uncontrolled hypertension. Reviews suggest that adherence is better in developed nations compared to developing nations. As per a systematic review, the pooled percentage of adherence among hypertensives of low- and middle-income countries is 36.65%, while in a high-income country like the United States, it is 51%.^[7,8] In the present study, 41.3% had high adherence, while the remaining 58.7% had either medium or low adherence. The reported adherence levels are lower than those reported by studies from Kolkata (73%) and Mumbai (63.7%) but higher than those reported by studies from Hyderabad (39.4%) and Delhi (30%).^[9-12] The study findings were similar to studies from Brazil and Nigeria where the level of adherence among the participants was 43.1% and 42.9%, respectively.^[13,14] Even though there is wide range in prevalence rates of adherence, it is still a global public health problem. These variations could also be attributed to the different scales used to measure adherence. There are 43 different scales available to measure adherence.^[15] The present study used the 4-item MMAS, a reliable screening tool for measuring medication adherence in low-income settings with a high predictive validity to blood pressure control.^[16,17] Other commonly used scales are Beliefs and Behavior Questionnaire, Brief Medication Questionnaire, Hill-bone Compliance Scale, and Medication Possession Ratio.^[15,18]

In the present study, poor knowledge about the complications of uncontrolled hypertension was an independent risk factor for poor adherence. Similarly, studies by Hussanin *et al.* and Ambaw *et al.* in Bangladesh and Ethiopia, respectively, reported that knowledge about the disease is a predictor of adherence

Table 2: Clinical profile of patients

Variable	Frequency (f) (%)
Duration of hypertension (years)	
<2	17 (9.0)
2-5	53 (28.0)
5-10	51 (27.0)
≥10	68 (36.0)
Clinical presentation at diagnosis	
Symptomatic	60 (31.7)
Asymptomatic	129 (68.3)
Healthcare facility availed	
Public	35 (18.5)
Private	154 (81.5)
Out-of-pocket expenditure for medicines	
None	27 (14.26)
Present	162 (85.74)
Knowledge of complications	
Good (≥2 answers)	111 (58.7)
Poor (<2 answers)	78 (41.3)
History of any complication	
Coronary artery disease	30 (15.9)
Cerebrovascular disease	14 (7.4)
Chronic kidney disease	7 (3.7)
None	143 (75.7)
Family history of complications	
Present	71 (37.6)
Absent	118 (62.4)
Other comorbidities	
Diabetes	88 (46.6)
COPD	20 (10.6)
Dyslipidemia	71 (47.6)
Hypothyroidism	3 (1.6)
Arthritis	2 (1.1)
Cancer	1 (0.5)
None	55 (29.1)
Smoking (n=93 males)	
Current smoker	7 (7.5)
Ex-smoker	40 (43.0)
Nonsmoker	46 (49.5)
Alcohol consumption (n=93 males)	
≥2 days/week	14 (15.1)
<2 days/week	29 (31.2)
Former	25 (26.9)
Never	25 (26.9)

to medication.^[19,20] Although knowledge was a common risk factor identified in these studies, it cannot be compared, as different domains of knowledge were assessed. While the present study looked at knowledge about complications, other studies assessed the knowledge about disease etiology and treatment benefits.^[8] Empowering the patients with correct knowledge about the disease, its treatment and benefits can help overcome the misguided cultural beliefs and associated misconceptions.

Availing medications from the pharmacy in a government health facility was a significant risk factor for nonadherence in the present study. This might be due to the erratic availability of medications in government facilities, leading to an access barrier

Table 3 : Factors associated with poor adherence to medication

Variable	Poor adherence (%)	High adherence (%)	OR (95% CI)	P
Age (years)				
≤60	37 (56.1)	29 (43.9)	1.138 (0.624-2.077)	0.672
>60	65 (52.8)	58 (47.2)		
Gender				
Female	59 (61.5)	37 (38.5)	1.854 (1.039-3.308)	0.036
Male	43 (46.2)	50 (53.8)		
Socioeconomic class				
≤Middle class	32 (56.1)	25 (43.9)	1.612 (0.779-3.336)	0.197
>Middle class	27 (44.3)	34 (55.7)		
Alcohol consumption				
Yes	19 (44.2)	24 (55.8)	0.601 (0.303-1.192)	0.143
No	83 (56.8)	63 (43.2)		
Ever smoker				
Yes	19 (40.4)	28 (59.6)	0.482 (0.246-0.944)	0.032
No	83 (58.5)	59 (41.5)		
Asymptomatic at diagnosis				
Yes	80 (62)	49 (38)	2.820 (1.496-5.317)	0.001
No	22 (36.7)	38 (63.3)		
Disease duration (years)				
≤10	81 (57)	61 (43)	1.644 (0.846-3.194)	0.141
>10	21 (44.7)	26 (55.3)		
Treatment facility availed				
Public	20 (57.1)	15 (42.9)	1.171 (0.558-2.455)	0.676
Private	82 (53.2)	72 (46.8)		
Pharmacy facility availed				
Public and subsidy shops	34 (70.8)	14 (29.2)	2.607 (1.289-5.274)	0.007
Private	68 (48.2)	73 (51.8)		
OoPE (rs)				
≥450	40 (48.8)	42 (51.2)	0.691 (0.388-1.233)	0.210
<450	62 (57.9)	45 (42.1)		
Number of medicines per day				
≥4	24 (45.3)	29 (54.7)	0.615 (0.325-1.166)	0.135
<4	78 (57.4)	58 (42.6)		
Knowledge				
Poor	49 (62.8)	29 (37.2)	1.849 (1.024-3.340)	0.041
Good	53 (47.7)	58 (52.3)		
Other comorbidities				
None	35 (63.6)	20 (36.4)	1.750 (0.918-3.337)	0.088
Yes	67 (50)	67 (50)		
Advice on adherence				
Given	23 (62.2)	14 (37.8)	1.518 (0.727-3.171)	0.265
Not given	79 (52)	73 (48)		

OoPE: Out-of-pocket expenditure; CI: Confidence interval; OR: Odds ratio

Table 4: Logistic regression for factors associated with poor adherence to medication

Variable	Adjusted OR (95% CI)	P
Asymptomatic at diagnosis	3.347 (1.695-6.607)	<0.001
Availing government pharmacy	2.379 (1.131-5.004)	0.022
Poor knowledge of complications	2.120 (1.110-4.048)	0.023
No other comorbidities	1.860 (0.929-3.726)	0.080

CI: Confidence interval; OR: Odds ratio

for the patients. This factor assumes great importance in light of the fact that the Government of India launched the National Program For Prevention and Control of Cancer, Diabetes,

Cardiovascular Disease, and Stroke in 2008 under which people aged above 30 years are screened for hypertension.^[21] As a result, many previously undiagnosed cases are being diagnosed and put on treatment, but the intended benefits of the programme, i.e., reduction in mortality from NCDs, will not be realized unless adherence is ensured.

Conversely, OoPE was not a risk factor of nonadherence in this study. A similar finding was reported by Dennis *et al.* in their study conducted in Bengaluru.^[22] This is in contrast to studies done in Nigeria and Ghana.^[23,24] A review article which looked at the patient factors affecting therapeutic compliance

also found costs of treatment as a significant factor affecting compliance.^[25]

The asymptomatic nature of the disease can hinder the patient's motivation to treatment, as there is no tangible benefit experienced by the patient. In the present study too, proportion of patients with poor adherence was significantly higher among those who were asymptomatic at the time of diagnosis compared to those who were symptomatic. Similar findings were reported by Bhandari *et al.* and Ogedegbe *et al.*^[9,26]

The study being a community-based study gives a more accurate picture of the "effectiveness" of antihypertensive treatment. It reiterates the need for interventions aimed at improving adherence, and further research would be needed to identify such interventions that are suitable to the local community. The limitation of the study is the use of 4-item MMAS that has not been validated in the local language.

Conclusion

The study suggests that the adherence among hypertensives in a rural population in Kerala is poor and the factors that determine this include poor knowledge, asymptomatic nature of the disease, and utilizing the pharmacy of a government health facility. A comprehensive strategy to improve adherence to antihypertensive medications is the need of the hour.

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Conflicts of interest

There are no conflicts of interest.

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